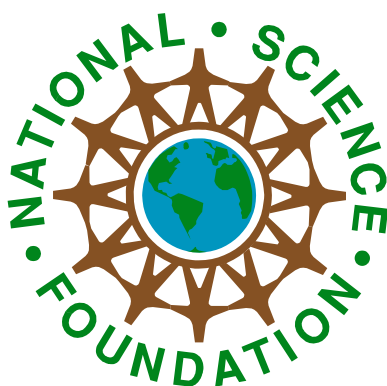DRAFT

National Science Foundation

FY 2003 - 2008
GPRA Strategic Plan

Draft 3.1 (NSB-03-70)
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PREFACE

NSF ROLE

Created in 1950, NSF is an independent U.S. government agency responsible for advancing science and engineering (S&E) in the United States across a broad and expanding frontier. NSF plays a critical role in supporting fundamental research, education and infrastructure at colleges, universities, and other institutions throughout the country. Although NSF represents about four percent of the total federal budget for research and development, it accounts for approximately one-fifth of all federal support for basic research and 40 percent of non-life-science basic research at U.S. academic institutions. NSF's broad support for basic research, particularly at U.S. academic institutions, provides not only a key source of funds for discovery in many fields, but also unique stewardship in developing the next generation of scientists and engineers. NSF is also the principal federal agency charged with promoting science and engineering education at all levels and in all settings, from pre-kindergarten through career development. This helps ensure that the United States has world-class scientists, mathematicians and engineers, and well-prepared citizens.

> "New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."
>
> - Letter from Franklin D. Roosevelt to Dr. Vannevar Bush, November 17, 1944.

Except for the South Pole Station and the other Antarctic Program facilities, NSF operates no laboratories or research facilities itself, but rather carries out its mission primarily by making merit-based grants and cooperative agreements to individual researchers and groups, in partnership with colleges, universities, and other institutions – public, private, state, local, and federal – throughout the U.S. NSF uses merit review to select about 10,000 new awards each year from more than 32,000 competitive proposals submitted by the science and engineering research and education communities.

NSF works with its partner institutions and organizations to chart new paths for S&E research and education. For example, NSF fosters strategic collaborations with key national and international counterparts that address national and global science and engineering priorities. NSF has been designated to lead interagency initiatives in such areas as information technology research and nanotechnology.

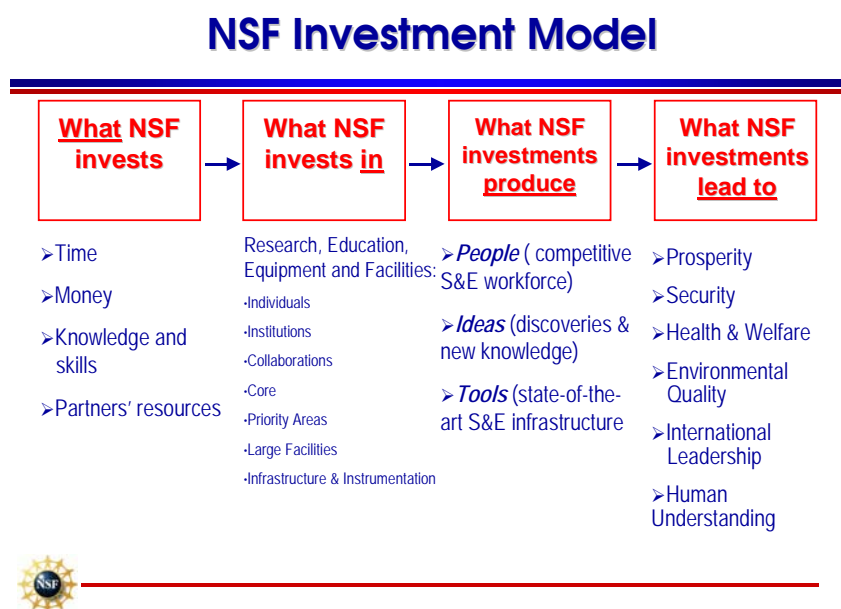The National Science Board (NSB) is NSF's policymaking board and serves as adviser to the President and Congress on policy matters related to science and engineering research and education. The Board is composed of 24 part-time members, who are appointed by the President and confirmed by the Senate. They are selected on the basis of their eminence in science, engineering, education, and public affairs.

CONTEXT FOR STRATEGIC PLAN

Strategic planning may be described as "a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization is, what it does, and why it does it, with a focus on the future."[1] Within the Federal government, strategic planning has a legal context, defined by the Government Performance and Results Act (GPRA) of 1993.

GPRA mandates Federal agencies to account for program results through the integration of strategic planning, budgeting, and performance measurement. According to Office of Management and Budget (OMB) Circular A-11, the specific instructions for implementing the GPRA in Federal agencies, "the strategic plan is a tool to be used in setting priorities and allocating resources consistent with those priorities." It also provides the framework for the preparation of annual agency performance plans and reports. The GPRA requires Federal agencies to prepare strategic plans that address their missions over a six-year period, and to update their plans every three years.

Investment Model. NSF invests in the future. Its strategic plan (i.e. vision, mission and goals) is based upon the simple model shown below.

NSF Investment Model

What NSF invests	What NSF invests **in**	What NSF investments **produce**	What NSF investments **lead to**
➢Time ➢Money ➢Knowledge and skills ➢Partners' resources	Research, Education, Equipment and Facilities: ·Individuals ·Institutions ·Collaborations ·Core ·Priority Areas ·Large Facilities ·Infrastructure & Instrumentation	➢*People* (competitive S&E workforce) ➢*Ideas* (discoveries & new knowledge) ➢*Tools* (state-of-the-art S&E infrastructure)	➢Prosperity ➢Security ➢Health & Welfare ➢Environmental Quality ➢International Leadership ➢Human Understanding

Congress appropriates NSF budget resources annually. NSF's intangible, continuing resource is its human capital, which, in part, consists of the knowledge and skills of it workforce, its technology and tools, and its work practices.

As prescribed in its enabling legislation, NSF invests its resources in a broad range of education, research, infrastructure and related activities. Investment priorities are established through NSF's planning and budget process (described in Section II.) Long-term planning issues, such as those

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[1] Bryson, J.M. (1995). *Strategic Planning for Public and Nonprofit Organizations.* San Francisco: Jossey-Bass.

discussed in the next section (Situation Analysis), provide the context for discussing budget priorities with OMB, Congress and the S&E community.

The selection of specific projects for funding is guided by NSF's competitive merit review process. NSF evaluates proposals for research and education projects using two criteria: the intellectual merit of the proposed activity and its broader impacts.

The direct products of NSF's investments are best described by its strategic goals: *People, Ideas, and Tools*, and by the resource-linked output goals that are associated with them. These goals provide a results-oriented focus for NSF's investments, and a framework for assessing program performance.

The longer-term impacts of NSF investments (i.e. "What NSF investments lead to") are generally specified in NSF's mission statement: *"To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."* Although, in the short term, it is sometimes difficult to link specific research and education projects with these longer term impacts, the overall linkage has been demonstrated time and again, and underpins the public's confidence in the value of S&E research and education.

Organizational Context. This updated strategic plan retains and further strengthens the People-Ideas-Tools framework, and adds a new goal for *Organizational Excellence*, in keeping with the belief that achieving NSF's mission is impossible without sustained excellence in NSF's business processes. NSF recently developed a strategic plan specifically for its investments in administration and management, the centerpiece of which is an ongoing business analysis.[2] The *Organizational Excellence* goal focuses on the strategies and resources that enable the Foundation to be a leader among Federal agencies in implementing state-of-the-art business and management practices. This increased emphasis on administration and management also speaks

directly to NSF's efforts under the President's Management Agenda (PMA). The purpose of the PMA is to motivate federal agencies to focus on the achievement of five White House government-wide management initiatives, as shown in this chart. Agencies receive ratings of green, yellow, and red for agency status and progress for each of these initiatives on quarterly PMA scorecards. To date, NSF is the only Federal agency to receive any green ratings, having received one for Financial Management and one for E-Government.

President's Management Agenda Scorecard

	Baseline 9/30/2001	Status: 12/31/2002
Strategic Management of Human Capital	R	R
Competitive Sourcing	R	R
Financial Management	G	G
Expanding E-Gov't.	Y	G
Budget & Performance Integration	R	R

Note: Green represents success; yellow for mixed results; and red for unsatisfactory. www.whitehouse.gov/omb/budget/fy2003/msr06.html.

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[2] The Administration and Management Strategic Plan is available at: http://www.inside.nsf.gov/od/am/

The PMA initiative Budget and Performance Integration highlights the role of assessment and evaluation in agency planning and budgeting. For this purpose, OMB is now requiring all agencies to use the PART, the Program Assessment Rating Tool, to assess program performance in four areas: program purpose, strategic planning, program management, and program results. The PART complements and reinforces GPRA, emphasizing the link between budget and performance. Resulting PART ratings inform the budget process and highlight areas in need of improvement. The *resource-linked output goals* in this document provide a program structure for the PART assessments, a schedule for which is proposed in Appendix A.

For NSF and other Federal agencies with significant R&D portfolios, the PART and other planning and assessment activities are now required to draw heavily upon the R&D Criteria established by OMB and OSTP for the FY 2004 budget process: 1) Quality, 2) Relevance, and 3) Performance. These criteria are consistent with NSF's proposal review criteria, and are reflected in the goals and strategies developed in this plan.

> ### R&D INVESTMENT CRITERIA
>
> - Quality**:** R&D programs must justify *how* funds will be allocated to ensure quality R&D.
> - Relevance: R&D programs must be able to articulate *why* this investment is important, relevant, and appropriate.
> - Performance: R&D programs must be able to monitor and document *how well* the investment is performing.
>
> http://www.ostp.gov/html/ombguidmemo.pdf

The intent of these requirements is to create a federal government that is responsive and accountable to its citizens – one that is focused on national priorities and executes them well. NSF is responsive to these mandates. However, in responding to pressures to measure the agency's research performance, care must be taken to do no harm to the R&D system that has delivered so much good to the Nation. The May 2002 OMB-OSTP joint memorandum that specified the new R&D criteria included this cautionary note: *"While the criteria apply broadly to all types of R&D, agencies should not have the same expectations for planning and measuring the results of long-term, high-risk basic research as they have for applied research and development.... Serendipitous results are often the most interesting and ultimately may have the most value."*
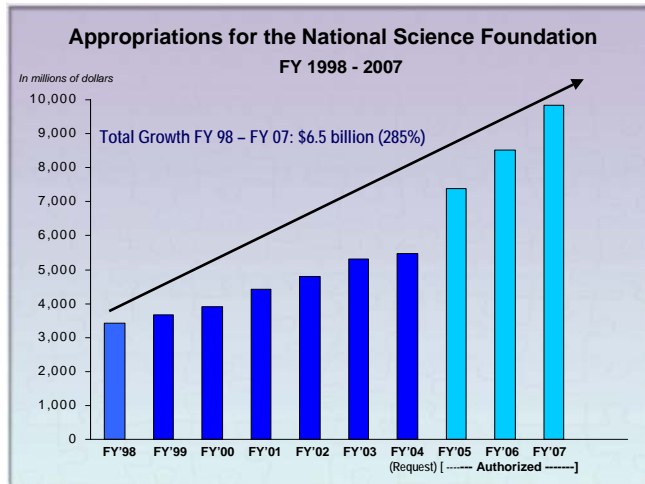
SITUATION ANALYSIS

The strategic planning process is a dynamic one. It must acknowledge and respond to many external issues, some of which are concerned with the nature, direction and process of research and education, and others concerned with its potential impacts. In updating its strategic plan, it is useful for NSF to take cognizance of these issues, with the understanding that they are in flux and must be continually assessed. They include the following:

- **Changing S&E Frontier:** Because the frontiers of science and engineering continually evolve and advance, NSF programs and strategies require constant monitoring and adjustment. This is the principal driver of change for NSF. With hundreds of proposal competitions, meetings with experts, formal workshops and reports from commissions throughout the year, NSF is constantly listening, analyzing and responding to thoughts from the research and education community.

- **S&E Workforce:** The global competition for highly skilled technical workers and S&E professionals is escalating, while fewer U.S. students are choosing to go into graduate science and engineering programs. Since 1993, enrollment of U.S. students in these programs has dropped nine percent. To maintain the technological lead the United States enjoys throughout the world, it will be necessary to recruit much greater numbers of women and minorities into the S&E workforce.

- **Science and Math Skills:** Concerns persist over the state of mathematics and science education in the United States. The Third International Math and Science Study compared American students with students in other countries. It found that U.S. fourth graders did relatively well in both subjects, but by the time they reached their senior year in high school, U.S. students ranked very low compared to students in other countries. The U.S. Department of Labor estimates that 60% of the new jobs being created in our economy today will require technological literacy while only 22% of the young people entering the job market now actually possess those skills.

- **S&E Infrastructure:** Recent concepts of infrastructure are changing from big pieces of hardware on the floor to distributed systems of hardware, software, information bases, and expert systems. The exponential growth in computing power, communication bandwidth, and data storage capacity will continue for the next decade. This will profoundly affect the way research and education are conducted.

- **Internationalization**: Collaborative activities and international partnerships provide increasingly important means of keeping abreast of new insights and discoveries critical to maintaining U.S. leadership in key fields. Increased concerns about homeland security are complicating all aspects of international collaboration.

- **Security:** With the heightened concerns over homeland security, advances in science and technology are needed to prevent and counter potential future threats and attacks. NSF's broad research portfolio has and will continue to enable such advances, especially in areas such as cybersecurity, trusted systems, bioterrorism, and critical infrastructure protection.

- **Environment:** Environmental research and education are central elements of local, national, and global security, health, and prosperity, as is discussed in the recent report, *Complex Environmental Systems: Synthesis for Earth, Life, and Society in the 21st Century,* prepared by NSF's Advisory Committee for Environmental Research and Education. The world is also facing the prospect of rapid environmental and climate change and the complicated question of long-term environmental security.

NSF's leadership role in U.S. science and engineering was recently underscored by The National Science Foundation Authorization Act of 2002, P.L. 107-368, enacted in December 2002. As indicated in the following chart, the funding levels authorized in the Act would lead to an NSF investment portfolio of nearly $10 billion by FY 2007.

Appropriations for the National Science Foundation FY 1998 - 2007

In millions of dollars

Total Growth FY 98 – FY 07: $6.5 billion (285%)

FY'98 FY'99 FY'00 FY'01 FY'02 FY'03 FY'04 FY'05 (Request) [------- Authorized -------] FY'06 FY'07

In addition, the policy objectives expressed in the Act parallel the basic thrusts of this strategic plan. Among the specific objectives outlined in the Act are expanding the pool of scientists and engineers in the U.S., strengthening both core and priority areas of science and engineering, modernizing the nation's research infrastructure, increasing overall workforce skills, and strengthening innovation at the regional and local level.

I. INTRODUCTION

A. VISION STATEMENT

ENABLING THE NATION'S FUTURE THROUGH DISCOVERY, LEARNING AND INNOVATION

NSF investments – in people, in their ideas, and in the tools they use - will catalyze the strong progress in science and engineering needed to establish world leadership and secure the Nation's security, prosperity, and well-being.

B. MISSION STATEMENT

NSF's continuing mission is set out in the preamble to the National Science Foundation Act of 1950 (Public Law 810507):

TO PROMOTE THE PROGRESS OF SCIENCE; TO ADVANCE THE NATIONAL HEALTH, PROSPERITY, AND WELFARE; TO SECURE THE NATIONAL DEFENSE; AND FOR OTHER PURPOSES

The Act authorizes and directs NSF to initiate and support:

- Basic scientific research and research fundamental to the engineering process,
- Programs to strengthen scientific and engineering research potential,
- Science and engineering education programs at all levels and in all fields of science and engineering, and
- An information base on science and engineering appropriate for development of national and international policy.

Over time, the following additional responsibilities were added to the agency's mission: (1) foster the interchange of scientific and engineering information nationally and internationally; (2) support the development of computer and other methodologies; (3) maintain facilities in the Antarctic and promote the U.S. presence through research conducted there; and (4) address issues of equal opportunity in science and engineering.

C. STRATEGIC GOALS

NSF investments produce outcomes at the core of the research and education enterprise: a world-class science and engineering workforce; new knowledge across the frontiers of science and engineering; and the tools to get the job done efficiently and effectively. Expressed simply as *People, Ideas,* and *Tools*, (PIT) these long-term strategic goals reflect the changing role and increased significance of science and engineering in the 21st Century.

NSF introduced the PIT goals in its last strategic plan – developed three years ago and covering FY 2001 to FY 2006. Since then, the PIT framework has had a dramatic impact on both NSF's internal processes and on its leadership throughout research and education. It has proven to be

an agile framework for highlighting NSF's accomplishments and its global preeminence in science and engineering. The PIT framework encourages approaches to achieving NSF's mission that reach across and connect the various parts of NSF's discipline-based structure. This is most evident through NSF's emphasis on supporting interdisciplinary activities, such as the priority areas identified in its annual budgets, and through the use of key investment strategies, such as integration of research and education.

This updated strategic plan retains and further strengthens the PIT framework, and adds a new strategic goal for *Organizational Excellence*, in keeping with the belief that achieving NSF's mission is impossible without sustained excellence in NSF's business processes.

PEOPLE GOAL – A DIVERSE, COMPETITIVE, AND GLOBALLY-ENGAGED U.S. WORKFORCE OF SCIENTISTS, ENGINEERS, TECHNOLOGISTS AND WELL-PREPARED CITIZENS

Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically and mathematically strong. Investments in *People* aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. Each year, NSF supports more than 200,000 people – teachers, students, and researchers at every educational level and across all disciplines in science and engineering.   Embedded in all NSF programs are efforts to build a more inclusive and globally engaged workforce that fully reflects the strength of the Nation's diverse population.

IDEAS GOAL - DISCOVERY ACROSS THE FRONTIER OF SCIENCE AND ENGINEERING, CONNECTED TO LEARNING, INNOVATION AND SERVICE TO SOCIETY

Investments in *Ideas* are aimed at the frontiers of science and engineering. They build the intellectual capital and fundamental knowledge that drive technological innovation, spur economic growth, and increase national security and welfare. They also seek answers to the most fundamental questions about the origin and nature of the universe and humankind.

TOOLS GOAL – BROADLY ACCESSIBLE, STATE-OF-THE-ART S&E FACILITIES, TOOLS AND OTHER INFRASTRUCTURE THAT ENABLE DISCOVERY, LEARNING AND INNOVATION

State-of-the-art tools and facilities boost the overall productivity of the research and education enterprise. NSF's strategy is to invest in a wide range of instrumentation, multi-user facilities, digital libraries and computational infrastructure that add unique value to research and are accessible and widely shared among researchers across the nation.

ORGANIZATIONAL EXCELLENCE GOAL - AN AGILE, INNOVATIVE ORGANIZATION THAT FULFILLS ITS MISSION THROUGH LEADERSHIP IN STATE-OF-THE-ART BUSINESS PRACTICES

Excellence in managing NSF underpins all of the agency's activities. Most importantly, this leadership depends on maintaining a diverse, agile, results-oriented NSF workforce that operates in a continuous learning environment. NSF's strategy focuses directly on the agency's leadership in core business processes, such as e-government and financial management. NSF's investments in administration and management must respond both to the growing complexity of its workload and to new requirements for accountability and transparency in its processes.

II. STRATEGY – THE LONG VIEW

A. CORE STRATEGIES

NSF employs three *core strategies* that guide the entire agency in establishing priorities, identifying opportunities, and designing new programs and activities. They cut across all NSF programs and activities, and each is critical to accomplishing NSF's strategic goals.

(1) Develop Intellectual Capital

NSF invests in projects that enhance individual and collective capacity to perform, i.e. to discover, learn, create, identify problems and formulate solutions. It seeks investments that tap into the potential evident in previously underutilized groups of the Nation's human resource pool. This strategy is crucial to the accomplishment of NSF's strategic goals. It is the key strategy for developing a competitive S&E workforce. In all of NSF's research programs, developing new knowledge goes hand-in-hand with educating students and informing the public through outreach.

> NSF is strongly committed to increasing the participation in all NSF activities of science and engineering researchers, educators and students from groups currently underrepresented in the science and engineering enterprise. Congress has enacted legislation giving NSF explicit responsibility for addressing issues of equal opportunity in science and engineering. NSF promotes diversity by embedding it throughout its investment portfolio.

(2) Integrate Research and Education

NSF invests in activities that integrate research and education, and that develop reward systems to support teaching, mentoring and outreach. Effective integration of research and education at all levels infuses learning with the excitement of discovery. It also ensures that the findings and methods of research are quickly and effectively communicated in a broader context and to a larger audience. This strategy is vital to the accomplishment of all of the strategic goals.

(3) Promote Partnerships

Collaboration and partnerships between disciplines and institutions and among academe, industry and government enable the movement of people, ideas and tools throughout the public and private sectors. Furthermore, these partnerships optimize the impact of people, ideas and tools on the economy and on society.

> *International partnerships* are vital to achieving NSF's goals. The very nature of the science and engineering enterprise is global, often requiring access to geographically dispersed materials, phenomena, and expertise. It requires open and timely communication, sharing, and validation of findings. NSF integrates international cooperation in all S&E programs in order to ensure U.S. access to worldwide talent, ideas, information, S&E infrastructure, and partnerships.

B. INVESTMENT STRATEGIES

NSF's research and education mission requires it to push at frontiers of science and engineering. As new discoveries and breakthroughs are made, people are needed to fill in the knowledge base. In implementing its goals, NSF employs two major integrative investment strategies:

1) **Strengthen Core Activities:** NSF investments in core research and education activities are targeted to disciplinary and multidisciplinary programs that support the best new ideas generated by the academic community. These funds support single investigators, small groups, and centers and provide the primary support for early career faculty and students. They are extremely important in invigorating the research community since they promote emergence of new ideas and fields, especially in areas where disciplines are blurred and new technologies emerge. Investments in the core activities ensure the vitality of a broad array scientific and engineering fields that are needed for the U.S. to maintain leadership in science and engineering.

   > **Centers**. NSF supports a variety of individual centers and centers programs, which contribute to NSF's investment in Ideas. The centers play a key role in furthering the advancement of science and engineering in the U.S., particularly through their encouragement of interdisciplinary research and the integration of research and education. While the programs are diverse, the centers generally share common commitments to coordination and team-based cross-disciplinary research.

   A key element of this strategy is to increase the size and duration of research grants to ensure high productivity among researchers and improve opportunities for educating students. Making larger research grants of longer duration will enable Principal Investigators to take more risks and focus on more complex research goals with longer time horizons. Larger, longer-term grants will increase productivity by minimizing the time researchers and educators must spend writing proposals and managing administrative tasks. NSF's FY 2004 budget request defines a path toward average annualized research grants of $250,000 for five years. Such a target is consistent with the findings of the recent survey of NSF-supported Principal Investigators and institutions.[3]

2) **Identify and Support Priority Areas:** The core activities are integrative in that they enable researchers and educators to cross S&E boundaries, and in the process reinvent current fields and disciplines and invent new ones. These core activities identify prospects for more intensive investment - the priority areas. In close collaboration with the NSB and the science and engineering community, NSF identifies priority areas in which to make a sustained level of investment – usually five years – to move research forward rapidly while training a new cadre of scientists and engineers who can transform fields and spur industrial innovation. Each of these priority areas contributes to strengthening U.S. world leadership in areas of global economic and social significance, as is evidenced by their natural overlap with the R&D priorities established by the Administration. NSF's current priority areas are:

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[3] *NSF Report on Efficiency of Grant Size and Duration*, Mathematica Policy Research, Inc., July 2002

- ***Biocomplexity in the Environment (BE):*** The BE priority area is a multidisciplinary effort that draws on new scientific and technological capabilities to investigate the interactions among biological, ecological, social, engineered and earth systems. The primary goals are to: synthesize knowledge across disciplines; improve science-based forecasting capabilities for complex environmental systems; and advance a broad range of methods, tools, and infrastructure to support interdisciplinary activities.

- ***Human and Social Dynamics (HSD):*** This investment seeks to better understand the causes and ramifications of change in order to increase our collective ability to anticipate and prepare for its effects on us as individuals and our institutions. HSD will also support research on the dynamics of the human mind. Through understanding the cognitive and social structures that create and define change, people and organizations will be better able to manage the profound and rapid changes that define our world.

- ***Information Technology Research (ITR):*** This priority area exploits and deepens fundamental research on the challenges facing the expansion and utilization of IT across science and engineering. From the investigation, development, and strengthening of large-scale networks to the creation of new integrative software and advanced architectures for high-end computing, IT will continue to be essential in the growth of our economy and in solving critical problems facing our nation.

- ***Mathematical Sciences:*** The mathematical sciences provide both powerful tools for insight and a common language to enable S&E progress in such areas as genomics, climate science, and information technology and allow scientists and engineers to tackle a broad range of important challenges long considered intractable. This investment supports fundamental research in the mathematical sciences and the integration of mathematical and statistical research and education across the full range of science and engineering disciplines.

- ***Nanoscale Science and Engineering:*** This priority area encompasses the systematic organization, manipulation and control of matter at atomic, molecular and supramolecular levels. With the capacity to manipulate matter at this scale, science, engineering, and technology are realizing revolutionary advances, in areas such as individualized pharmaceuticals, new drug delivery systems, more resilient materials and fabrics, and order of magnitude faster computer chips.

- ***Workforce for the 21st Century:*** NSF will pursue research and education efforts that create a deeper understanding of what draws students to S&E careers, how to ensure broader participation, how to better prepare students to pursue S&E careers, and how to address critical S&E workforce needs.

These investment strategies are complementary. The core activities identify prospects for more intensive investment - the priority areas. In turn, the priority areas lift the capabilities of the core disciplines, enabling them to strike out in new directions. These two strategies enable NSF to reflect these dynamics in its investment portfolio.

C. ESTABLISHING PRIORITIES

NSF establishes priorities through a process that integrates broad-based input provided by the science and engineering community with the overall strategic direction set by the Foundation's leadership, through interactions with the NSB, OMB, OSTP, the Congress, and other R&D agencies and institutions. With hundreds of proposal competitions, meetings with experts, formal workshops and reports from commissions throughout the year, NSF is constantly listening, analyzing and responding to thoughts from the research and education community. External advice, information, and recommendations are also formally sought through interactions with Committees of Visitors and Advisory Committees. Indeed, a key mechanism for identifying emerging opportunities is the 30,000 + solicited and unsolicited proposals that NSF evaluates annually through its competitive merit-review process.

NSF's budget process focuses on identifying the most promising opportunities and giving them increased attention. In establishing budget priorities, NSF works very closely with the NSB, which has the responsibility for establishing NSF policies. In particular, the NSB Committee on Strategy and Budget closely works with NSF management to develop budget policies and strategies. The full NSB reviews and approves NSF's budgets and long-range plans, as well as new programs and major projects. The final stage of priority setting occurs when OMB considers NSF's request in the context of the overall Administration budget. Congressional guidance is manifested through hearings, testimony, committee reports, and other interactions reflected in authorization and appropriations legislation.

The NSF and NSB consider many factors in determining budget priorities. Most important are NSF's merit review criteria of *intellectual merit* and *broader impacts* and OMB/OSTP's investment criteria of *quality, relevance* and *performance*. Other considerations include readiness, technical feasibility, response to national needs, affordability, international benchmarks and balance with existing programs of NSF and other agencies. Consideration is also given to resource limitations, policy concerns, and GPRA performance goals and results.

One issue that has been raised in a number of settings, including the recently completed PART assessments, is the transparency of NSF's priority-setting process. NSF is currently addressing this issue. For example, for the first time the FY 2004 budget justification includes a rank-ordered priority list of projects funded through the MREFC Account. In addition, NSF has entered a contract with the National Academy of Public Administration for a major organizational review that will include an analysis of NSF's priority setting processes.

D. RESOURCES

The table below shows how NSF's five budget accounts are aligned with NSF's strategic goals. In FY 2004, for example, approximately 95 percent of NSF's budget request ($5,481M) is designated for investments the agency makes in support of its goals for strategic outcomes – People (21 percent), Ideas (49 percent), and Tools (25 percent). The remaining 5 percent of the budget request is for Administration and Management (A&M), which provides operating support for the activities of the agency such as processing proposals, issuing awards and overseeing projects.

Account	STRATEGIC OUTCOME			
	PEOPLE	IDEAS	TOOLS	A&M
Research and Related Activities	388	2,557	1,120	42
Education and Human Resources	765	139	19	15
Major Research Equipment and Facilities Construction	0	0	202	0
Salaries & Expenses	0	0	0	226
Office of the Inspector General	0	0	0	9
Total[a]	$1,153	$2,696	$1,341	$291

[a] Numbers may not add due to rounding.

OMB Circular A-11 specifies that GPRA strategic plans must be based on a structure that links goals, performance, and budget resources. Hence, for each its four strategic goals, NSF has identified "resource-linked output goals" that are directly tied to specific budget lines and resources. The following figure illustrates this goal structure, using the FY 2004 budget request as an example).

GPRA GOAL STRUCTURE
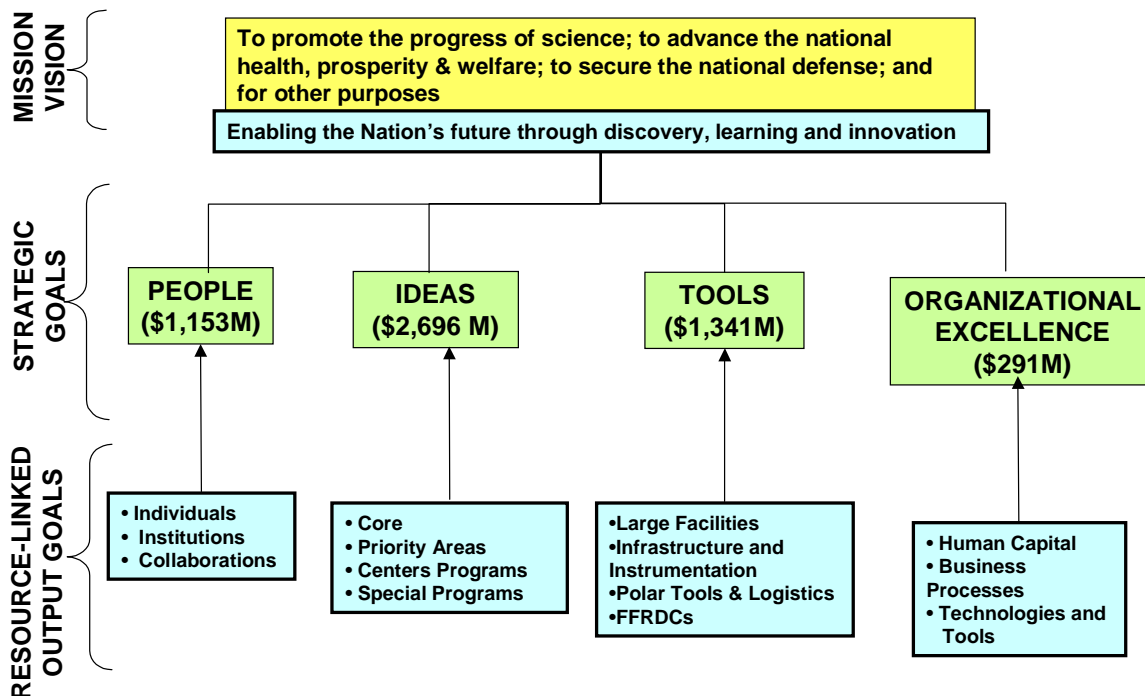
This budget-performance alignment ensures that NSF's budget is sufficiently linked with program goals in such a way that the impact of different funding levels on the agency's ability to achieve its goals is readily known. Each of the four strategic goals and their associated set of output goals are discussed in section III of this report. The goals and

strategies in this document will be used as a basis for organizing both the annual performance plan and the agency's corresponding annual budget request. The deployment of funds in these five budget accounts to the output goals associated with the People, Ideas, and Tools goals is done on a program-by-program basis. Each of NSF's programs is assigned to one of the resource-linked output goals based on the program's principal objective, integrated within NSF's holistic investment portfolio. (See Appendix C for a crosswalk of resource-linked output goals and NSF programs.)

NSF's strategy for further enhancing *alignment* of budget and program goals includes a reexamination of its account structure. NSF recognizes that such an effort requires simultaneous consideration of organizational alignment, distribution of budgetary resources, and the allocation of costs both to organizations and to outcomes. The expected added value to NSF managers is central in identifying areas to examine and in deciding whether to add or change existing structures.

E. EXTERNAL FACTORS AFFECTING SUCCESS

External factors affect NSF's ability to achieve its strategic outcomes. The Foundation relies on its many partners in the research and education enterprise to accomplish its strategic goals. While this wide array of institutions shares the agency's commitment to promoting progress of science through discovery, learning, and innovation, they also face a variety of circumstances that affect their ability to achieve the goals of NSF's investment. NSF's influence and leadership extends well beyond its budget. NSF brings together diverse elements of the larger science and engineering community to achieve its mission. This positions the agency to: (1) establish partnerships that leverage funds and (2) provide leadership that catalyzes new directions for research and education.

Factors beyond NSF's control include appropriations, indirect cost rates, government-wide policies, inflation, the budget and plans of other R&D agencies, the uncertainty and risk inherent in research, the availability of technology and the pace of technological innovation.

III. STRATEGIC GOALS

A. PEOPLE GOAL

A DIVERSE, COMPETITIVE, AND GLOBALLY-ENGAGED U.S. WORKFORCE OF SCIENTISTS, ENGINEERS, TECHNOLOGISTS AND WELL-PREPARED CITIZENS

NSF's investments in People enable the Foundation to meet its mission of promoting the progress of science, while facilitating the creation of a diverse, competitive and globally-engaged workforce of scientists, engineers and well-prepared citizens.

Statutory Authority:

"The Foundation is authorized and directed to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels . . ." (NSF Act of 1950)

"The Foundation is authorized to support activities designed to . . encourage women to consider and prepare for careers in science and engineering. . " (Science & Engineering Equal Opportunities Act; 42USC 1885)

"The Foundation is authorized to undertake and support a comprehensive science and engineering education program to increase the participation of minorities in science and engineering . . ." (Science & Engineering Equal Opportunities Act; 42USC 1885)

"The Foundation is authorized to undertake and support programs and activities to encourage the participation of persons with disabilities in the science and engineering professions." (Science & Engineering Equal Opportunities Act; 42USC 1885)

External Factors: The characteristics of the U.S. workforce of scientists and engineers are highly dependent on the systems in which they are educated and trained. For example, math and science achievement directly depends on programs managed in a variety of state and local educational systems. While NSF programs greatly impact educational systems and the public that supports them, they are but one influence among many factors.

Resource-linked Output Goals: The following long-term output goals link directly to NSF programs and budget resources. They provide the framework for development of more specific and time-dependent annual GPRA performance goals, and for other assessments, such as the PART:

- **Individuals:** Investments that ensure development of world-class scientists, engineers, mathematicians, technologists and educators.

- **Institutions:** Investments that enable colleges, universities and other institutions to attract increased numbers of students to S&E fields and enhance the quality of S&E education at all levels.

- **Collaborations:** Investments that foster partnerships with colleges, universities, school districts, and other institutions – public, private, state, local, and Federal – to strengthen S&E education at all levels and broaden participation in S&E fields.

Objectives: The means and strategies NSF uses to successfully accomplish the People Goal include the three NSF core strategies, the investment strategies discussed in Section II, and the following specific objectives:

> **Math and Science Partnership Awards**
>
> In September 2002, NSF and the Department of Education announced the first awards under the new Math and Science Partnership program. NSF and Education made 24 awards worth an anticipated $240 million over five years, which will affect at least two million students in 11 states. A key part of President Bush's *No Child Left Behind* education plan, these new awards aim to enhance the performance of U.S. students in mathematics and science.

- Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups in NSF activities. (Applies to the following output goals: **Individuals; Institutions; Collaborations**)

- Support programs that attract and prepare U.S. students to be highly qualified members of the global S&E workforce, including providing opportunities for international study, collaborations and partnerships. (**Individuals; Institutions; Collaborations**)

- Promote public understanding and appreciation of science, technology, engineering, and mathematics, and build bridges between formal and informal science education. (**Institutions; Collaborations**)

- Support innovative research on learning, teaching and education that provides a scientific basis for improving science, technology, engineering and mathematics education at all levels. (**Institutions; Collaborations**)

- Develop the Nation's capability to provide K-12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering and mathematics. (**Individuals; Institutions; Collaborations**)

B. IDEAS GOAL

DISCOVERY ACROSS THE FRONTIER OF SCIENCE AND ENGINEERING, CONNECTED TO LEARNING, INNOVATION AND SERVICE TO SOCIETY

Agency investments promote the emergence of new disciplines, fields, and technologies, along with the development of scientists and engineers able to embrace them and create the next generation of results. Basic research can yield important scientific discoveries that boost economic growth and enhance the quality of life through advances such as better weather forecasting, laser technology, earlier detection of cancer, and the creation of the Internet. Basic

research in emerging fields such as nanotechnology will provide new capabilities and generate more discoveries that will further improve the quality of life. By providing these resources, NSF contributes to the health and vitality of the U.S. research and education enterprise and enhances the Nation's capacity for sustained growth and prosperity.

Statutory Authority:

"The Foundation is authorized and directed to initiate and support basic scientific research and … research fundamental to the engineering process . . ." (NSF Act of 1950)

". . . The Foundation is authorized to initiate and support specific scientific and engineering activities in connection with matters relating to scientific and engineering applications upon society. . ." (NSF Act of 1950)

External Factors: NSF does not conduct research and education activities directly (i.e., NSF does not manage its own laboratories other than those in the Antarctic) but supports others who do. In particular, the circumstances of institutional partners in academe, the private sector, and the government affect how individuals and groups are able to respond in both proposing and conducting research and education. As with all basic research, the outcomes associated with NSF investments are likely to be unpredictable in content and timing. Many of these activities require years to develop and the outcomes can only be judged retrospectively. For such research activities, it is difficult to link long-term outcomes directly to annual budgets.

Resource-linked Output Goals: The following long-term output goals link directly to NSF programs and budget resources. They provide the framework for development of more specific and time-dependent annual GPRA performance goals, and for other assessments, such as the PART.

- **Core:** Investments in discovery and knowledge creation that advance the frontiers of science and engineering, and are connected to learning, innovation and service to society.

- **Priority Areas:** Investments in selected areas of high priority that hold exceptional promise for accelerating S&E progress, advancing the frontiers of knowledge, and addressing national interests.

- **Centers Programs:** Investments that enable organizations to integrate people, ideas, and tools on scales that are large enough to significantly impact important S&E fields and cross-disciplinary areas.

- **Special Programs (e.g. SBIR/EPScoR):** Investments that enhance the capability of individuals and institutions to conduct high quality, competitive research, education, and technological innovation.

Objectives: The means and strategies NSF uses to successfully accomplish the Ideas Goal include the three NSF core strategies, the investment strategies discussed in Section II, and the following specific objectives:

- Foster connections between discoveries and their use in the service of society. (Applies to the following output goals: **Core; Priority Areas; Centers; Special Programs**)

- Encourage collaborative research and education efforts – across organizations, disciplines, sectors and international boundaries. (**Core; Priority Areas; Centers; Special Programs**)

- Provide leadership in identifying and developing new research and education opportunities within and across S&E fields. (**Core**)

- Accelerate progress in selected S&E areas of high priority by creating new integrative and cross-disciplinary knowledge and tools, and by providing people with new skills and perspectives. (**Priority Areas**)

- Sustain an efficient and enabled research and education community by providing NSF grants of adequate size and duration and by other means. (**Core; Priority Areas**)

- Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education activities. (**Core; Priority Areas; Centers; Special Programs**)

C.   TOOLS GOAL

BROADLY ACCESSIBLE STATE-OF-THE-ART S&E FACILITIES, TOOLS, AND OTHER INFRASTRUCTURE THAT ENABLE DISCOVERY, LEARNING AND INNOVATION

NSF investments provide state-of-the art tools for research and education, such as instrumentation and equipment, multi-user facilities, accelerators, telescopes, research vessels and aircraft, and earthquake simulators. In addition, investments in Internet-based and distributed user facilities, advanced computing resources, research networks, digital libraries, and large databases are increasing as a result of rapid advances in computer, information, and communication technologies. NSF's investments are coordinated with those of other organizations, agencies and countries to ensure complementarity and integration.

Statutory Authority:

"The Foundation is authorized and directed to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels . . ." (NSF Act of 1950)

"The Foundation is authorized and directed to foster and support the development and use of computer and other scientific and engineering methods and technologies, primarily for research and education in the sciences and engineering; . . ." (NSF Act of 1950)

External Factors: In most cases, NSF does not directly operate the facilities that it supports. Typically, the Foundation makes awards to external entities to undertake construction, management and operation of facility projects. NSF's relationship with these organizations is

often collaborative in nature and defined in cooperative agreements between NSF and those organizations.

Resource-linked Output Goals: The following long-term output goals directly link to NSF programs and budget resources. They provide the framework for development of more specific and time-dependent annual GPRA performance goals, and for other assessments, such as the PART.

- **Facilities:** Investments in the development, construction, and operation of state-of-the-art facilities and platforms that enable communities of researchers and educators to work at the S&E frontier.

- **Infrastructure and Instrumentation:** Investments in state-of-the-art instruments, platforms, information technology, databases, and other tools that uphold U.S. S&E leadership and that enable diverse communities of researchers, educators and students working at the S&E frontier.

- **Polar Tools, Facilities and Logistics:** Investments that provide state-of-the-art tools, facilities and other infrastructure to enable world-class polar research and education.

- **Federally Funded R&D Centers (FFRDCs):** Investments in research, development, and R&D policy that create unique, important and long-term capabilities for the Federal government, in response to law, mandate or widely recognized need.

Objectives: The means and strategies NSF uses to successfully accomplish the Tools Goal include the three NSF core strategies, the investment strategies discussed in Section II, and the following specific objectives:

- Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms. (Applies to the following output goals: **Facilities; FFRDCs)**

- Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation. (**Infrastructure and Instrumentation)**

- Provide for the collection and analysis of the scientific and technical resources of the U.S. and other nations to inform policy formulation and resource allocation.(**Infrastructure and Instrumentation; FFRDCs)**

- Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of the-art S&E facilities, tools, databases, and other infrastructure. (**Facilities; Infrastructure and Instrumentation; Polar Tools, Facilities and Logistics)**

- Support research that advances instrument technology and leads to the development of next-generation research and education tools. (**Infrastructure and Instrumentation)**

D. ORGANIZATIONAL EXCELLENCE

AN AGILE, INNOVATIVE ORGANIZATION THAT FULFILLS ITS MISSION THROUGH LEADERSHIP IN STATE-OF THE-ART BUSINESS PRACTICES

Excellence in managing NSF's activities is an objective on par with the Foundation's mission-oriented outcome goals. It is critical to achievement of all NSF goals. This goal addresses the President's Management Agenda and focuses on management challenges and reforms identified by OMB or GAO, in NSF's annual review of financial and administrative systems as required by the Federal Managers' Financial Integrity Act, or by the NSF Office of Inspector General.

> NSF is an efficient agency. Of the federal funds it receives, 95 percent go to educational and research institutions and contractors; NSF's direct overhead amounts to only five percent. Funding for the agency has grown significantly in the past decade, while the agency's staffing level has remained flat. NSF is the only agency to receive the highest status rating (green) in two of the government-wide President's Management Agenda initiatives. In the initial assessment period, NSF was the lone agency to receive the top rating for financial management. During 2002, NSF became the first federal agency to receive the top rating for the e-government initiative.

Resource-linked Output Goals: The following long-term output goals directly link to NSF programs and budget resources. They provide the framework for development of more specific and time-dependent annual GPRA performance goals:

- **Human Capital** – a diverse, agile, results-oriented cadre of NSF knowledge workers committed to enabling the agency's mission and to constantly expanding their abilities to shape the agency's future.

- **Business Processes** – effective, efficient, strategically-aligned business processes that integrate and capitalize on the agency's human capital and technology resources.

- **Technologies and Tools** – flexible, reliable, state-of-the-art business tools and technologies designed to support the agency's mission, business processes, and customers.

Objectives: Excellence in managing the agency's activities underpins all of NSF's goals. Achievement of the following objectives are especially critical to NSF's goal achievement.

- **Operate a credible, efficient merit review system.** NSF's merit review process is the keystone for award selection. All proposals for research and education projects are evaluated using two criteria: the intellectual merit of the proposed activity and its broader impacts. Specifically addressed in these criteria are the creativity and originality of the idea, the development of human resources, and the potential impact on the research and education infrastructure. The merit review system is at the very heart of NSF's selection of the projects through which its outcome goals are achieved. Ensuring a credible, efficient system requires constant attention and openness to change.

> During the fall of 2000, NSF initiated development of an Administration and Management (A&M) Strategic Plan. The plan is based on enterprise-wide resource planning, with large components focused on the NSF workforce and information technology. The document addresses resource needs and conveys the critical role of administration and management in ensuring continuing success in the agency's outcomes. A final version was submitted to OMB in April 2002.

- **Utilize and sustain broad access to new and emerging technologies for business application.** NSF has moved aggressively to adopt new technologies in our business processes. NSF must sustain and further develop exemplary mechanisms to streamline business interactions, enhance organizational productivity, ensure accessibility to a broadened group of participants, and maintain financial integrity and internal controls.

- **Develop a diverse, capable, motivated staff that operates with efficiency and integrity.** NSF is dependent on the capability and integrity of its staff. Innovative methods of recruitment, development, retention and employee recognition are needed to meet future challenges.

- **Implement mandated performance assessment and management reforms in line with agency needs.** An organization that is dependent on public funds must be accountable to the public. The development and use of effective indicators of agency performance -- measuring NSF's ability to meet mission-oriented goals, its competent use of resources in the investment process, and its efficiency and effectiveness as a reliable partner to others -- are needed to better explain the agency's role to the public.

APPENDIX A: PERFORMANCE ASSESSMENT

Implementing GPRA has been a challenge for NSF and other agencies with missions involving research and education because the substance and timing of the outcomes of such activities are unpredictable. Many require years to develop and can only be judged retrospectively. As a result, NSF requested and received Office of Management and Budget (OMB) approval for use of the "alternative approach" in assessing agency progress toward achieving its Strategic Goals. Use of this alternative form enables NSF to use a retrospective qualitative approach in its annual GPRA assessments of the People, Ideas, and Tools goals.

The agency has traditionally used various types of assessments and evaluations to monitor *non-quantitative* research and education outcomes, the quality of its investments, and its processes. Formalized examination by members of the external community takes place during merit review of proposals, COV and AC/GPA assessments, and development of agency GPRA reports. Additionally, programs and plans are assessed and evaluated throughout the year on a continuing basis by NSF staff.

NSF uses internal data systems to monitor and report progress in achieving the *quantitative* management goals. The assessment process for the quantitative goals is straightforward. NSF collects relevant data using internal corporate data systems and compares the results with the performance levels targeted for the fiscal year.

Project Assessment During NSF Merit Review

The merit review process provides a rigorous, first phase of assessment of NSF's research and education portfolio. At the onset, this process selects for support only the most competitive one-third of proposals submitted for consideration.

During NSF merit review, applicants and grantees provide results from previous NSF support, information about existing facilities and equipment available to conduct the proposed activity, biographical information on the Principal Investigators, and information on other sources of support, federally required certifications and certifications specific to NSF. Such information is required at the time of application, at the time of an award, and in annual and final project reports. It is reviewed by NSF staff, utilized during merit review, and are made available to external committees (COVs and the AC/GPA) conducting performance assessment.

Program Officers review the annual progress of awards. The progress report includes information on significant accomplishments, on progress achieved in the prior year, on plans for the next year, and it points out issues that may impact progress or completion of the project on schedule and within budget. On approval of this report by the Program Officer, NSF releases funds for the ensuing year.

Program Assessment by Committees of Visitors (COVs)

NSF's Committees of Visitors provide external program assessments that are used in both program management and annual GPRA reporting. COVs conduct detailed reviews of the

materials associated with individual proposal actions. They have traditionally assessed the integrity and efficiency of the processes for proposal review. With the full implementation of GPRA in FY 1999, NSF added a retrospective GPRA component to their responsibilities.

Each COV typically consists of five to twenty external experts who review actions for one or more programs over a two or three day period. These experts are selected to ensure independence, programmatic coverage, and balanced representation. They typically represent academia, industry, government, and the public sector.

All COVs are asked to complete a report template with questions addressing how programs contribute to NSF goals. Their retrospective assessments of accomplishments related to the People, Ideas, and Tools strategic outcome goals are based on their collective experience-based norms. COV members are asked to justify their judgments and provide supporting examples or highlights that illustrate success and progress toward GPRA goals.

Each year, COVs assess approximately one-third of NSF's programs. Therefore, the full NSF portfolio of approximately 220 programs is assessed over a three year period.

Advisory Committee (AC) Reporting on Directorate/Office Performance

Advisory committees advise the seven directorates and the Office of Polar Programs. They are typically composed of 18-25 external experts who have broad experience in academia, industry and government. The role of the ACs is to provide advice on priorities, address program effectiveness, review COV reports, and examine directorate/office responses to COV recommendations.

In FY 2001 and previous years, directorate/office advisory committees assessed directorate/office progress in achieving NSF-wide GPRA goals. With the advent of the AC/GPA (see below), advisory committees no longer assess directorate progress toward these goals.

Advisory Committee for Business and Operations

In FY 2002, NSF established the Business and Operations Advisory Committee. The committee is composed of 15 members selected from the research administration, education management and business communities, including business professionals and academics in the field. The Committee is charged with providing advice on issues related to NSF's business practices and operations, including innovative approaches to the achievement of NSF's strategic goals.

Advisory Committee for GPRA Performance Assessment (AC/GPA)

During FY 2002, NSF determined that a more efficient and effective process for the assessment of agency performance with respect to GPRA strategic goals was to charge a single external committee of experts with review of all Foundation accomplishments. That decision resulted in the chartering of a new advisory committee on July 15, 2002. The committee's first meeting was held in September 2002. The AC/GPA is comprised of about 20-25 independent external experts representing academia, industry, and government.

The AC/GPA looks at Foundation-wide portfolios linked to the agency's strategic goals related to People, Ideas, and Tools. FY 2002 committee discussions and decisions were based on information provided by the NSF Directorates and the Office of Polar Programs. Committee members also had access to a variety of information, including COV reports. After its September 2002 meeting the AC/GPA provided NSF with a report concerning NSF performance with respect to the indicators associated with each strategic goal. The recommendations developed by the AC/GPA were utilized, along with other qualitative information and quantitative management results, to prepare the combined FY 2002 Performance and Accountability Report.

Agency GPRA Reporting

The AC/GPA and the COV reports address a broad set of issues, ranging from staffing and quality of merit review to specifics of a scientific project to agency progress related to outcome goals. NSF staff use the GPRA components of these reports in assessing the success of NSF in achieving its People, Ideas, and Tools strategic goals.

The criterion for success for each of NSF's strategic outcome goals can be stated:

"NSF is successful when, in the aggregate, results reported in the period demonstrate significant achievement in the majority of [associated indicators]."

The agency decision for NSF success for each goal is based on analysis of statements contained within the AC/GPA and COV reports. NSF staff examines individual ratings or statements of significant accomplishment in the reports to ensure that judgments are justified. In addition, there must be evidence or examples that support such judgments. Selected GPRA goals are verified and validated each year by external third parties.

APPENDIX B: CROSS-CUTTING ACTIVITIES

Collaboration and partnerships between disciplines and institutions and among academe, industry, and government encourage the transfer of people, ideas, and tools throughout the public and private sectors. While NSF participates in a wide range of cross-cutting activities, the agency has chosen to highlight its contributions only in the areas related to FY 2004 interagency research and development priorities identified by the Office of Science and Technology Policy and the Office of Management and Budget. These include:

- **Networking and Information Technology Research & Development (NITRD):** Networking and computing technologies are increasingly important technologies for the American economy, national and homeland security, and progress across science and engineering. The most recent government-wide plan for research in this area is available at http://www.ccic.gov.

- **National Nanotechnology Initiative (NNI):** This initiative holds great promise broadly across many scientific fields and most sectors of the economy. NSF emphasizes long-term fundamental research aimed at discovering novel materials, phenomena, processes and tools; addressing NNI Grand Challenges; supporting new interdisciplinary centers and networks of excellence, including shared user facilities; supporting research infrastructure; and addressing research and educational activities on the societal implications of advances in nanoscience and nanotechnology. The most recent information on NNI is available at <http://www.nano.gov./>

- **Climate Change Science and Technology:** A key aspect of the Administration's science-based climate change policy is investment in research and development (R&D) that will address major climate policy decisions and provide a framework for understanding and addressing long-term climate change. Priority funding areas include understanding the North American carbon cycle, research on climate change risk management, developing sensors to measure carbon dioxide and methane, and measuring and understanding the impact of black carbon. Additional information on this initiative is available at <http://www.usgcrp.gov/usgcrp/ccst.htm>

- **Homeland Security and Antiterrorism R&D:** Data mining to support antiterrorism analysis requires the ability to construct patterns from multiple, heterogeneous, data sources, some of which occur as massive streaming data sources in multiple languages. NSF will support research on ways to identify portions of these data that should be saved for analysis, or that contain new information on a developing knowledge structure. Of equal importance, NSF will support research on sharing data across agencies and from data sets that are separated by policy and by law. In these circumstances, research will explore methods to share data that either preserve privacy or include "probable cause" as a part of the data representation to be enriched by mining. Additional effort is being planned via workshops to engage the university research community in management of knowledge-intensive, high technology organizations, biometrics, geospatial information fusion, and biological sensors and sensor networks.

- **Molecular-level Understanding of Life Processes:** The past few years have seen major advances in our ability to sequence, analyze, and utilize complex genomic information from plants, animals, and microorganisms. Coupling such sequence and structural data to modern computational power and new experimental approaches that permit molecular manipulation of biological systems has the potential to unravel the complexity of life at all structural levels. Sequence data has already proven itself to be critical for homeland security forensic purposes.

  Efforts such as the Interagency Microbe Project, a microbe sequencing and physiology effort; the Interagency Working Group on Metabolic Engineering; the National Plant Genome Initiative; and The Ecology of Infectious Diseases Program all address fundamental patterns of molecular interactions which are reflected in function and behavior at the cellular, tissue, organismal, and population levels. NSF will focus on many of these areas; for instance, the 'Living Networks' area of emphasis will foster a molecular understanding of life at all levels of biological organization from genes to ecosystems. Other interdisciplinary programs such as the 'Frontiers in Integrative Biological Research' specifically seek the most innovative approaches to understanding the complexity and integration of life processes across all levels of organization.

- **Education Research:** Continuing as a high priority of the Administration, the No Child Left Behind (NCLB) Act of 2002 calls for research that enables the successful development and implementation of science-based programs and practices in K-12 education. Information on the government-wide Interagency Education Research Initiative is available at <http://www.ed.gov/offices/OERI/IERI>.

Excluded from the list above are priorities that fall within the purview of a single agency as well as a number of interagency research and development areas that do not require near-term policy or budget decisions.

APPENDIX C: CROSSWALK OF RESOURCE-LINKED OUTPUT GOALS AND NSF PROGRAMS

This crosswalk will be provided at a later date.

OUR ATTRIBUTES

We continually refresh our plans and strategies to assure that the agency will be:

OPEN - NSF is committed to the sharing of information and a free marketplace of ideas. It demonstrates an openness and facility for relating to all key constituents within and outside the organization.

INCLUSIVE – NSF takes a holistic view of opportunities and challenges, embracing diversity in all activities and at all levels.

INSPIRING – Through leadership and creative flair, NSF inspires agency staff and the community it serves to strive for the greatest levels of accomplishment. The community seeks out NSF for its quality and reliable perspective, insights and offerings. NSF has earned an international reputation that makes the agency a benchmark for other science and engineering agencies throughout the world.

PACE-SETTING – In identifying and supporting ideas with the greatest creativity, embracing new thinking, and using information technologies in innovative ways, NSF helps chart new paths for the science and engineering community.

INFLUENTIAL – In both the global community and the corridors of science and technology policymakers, NSF is viewed as a creative catalyst – credible, relevant and timely – as well as an excellent, statesperson-like organization that brings together other high-level decision makers.

AGILE – NSF quickly and effectively responds to changing needs and opportunities. It embraces change through effective systems-thinking and appropriate feedback mechanisms. NSF is a learning organization that is committed to self-improvement.

ACCOUNTABLE – NSF builds public trust by being professional, practical and orderly in its operating standards and how it manages its business. NSF and its staff are committed to excellence as a personal and an organizational standard.

HOW WE OPERATE

WE ENABLE people to perform by investing in their creative ideas, providing them with cutting-edge research and education tools, and supporting an infrastructure for education and learning.

WE PARTNER with a dynamic and diverse education and research community, working in a close trusting partnership while maintaining an independent perspective. We encourage partnerships among agencies, industry, academe, the states, and other nations when collaborative efforts further our goals.

WE INTEGRATE and synergize the knowledge and skills of diverse disciplines and constituencies. We promote the mutual sharing of knowledge and resources. We integrate the processes of discovery, innovation and learning, and connect them to societal use.

WE EMBRACE competitiveness in all of our programs and activities. We optimize the efficiency and effectiveness of our investments through the use of the competitive merit review process and peer evaluation of programs and activities.

WE MANAGE AND COMMUNICATE in a professional and effective manner. We listen intently to our customers, valuing their ideas and opinions. We effectively build consensus for new ideas and directions. We clearly articulate and communicate our values, plans, and activities so that customers and constituencies know what to expect of us. We provide the very best service possible to our customers.

WE INCLUDE all citizens, groups and constituencies, and promote equal opportunity for all. We work to ensure that the scientific and engineering workforce is as extensive and diverse as possible in order to create a more inclusive and robust enterprise.